CLAIMS

What is claimed is:

1. An engine comprising:

a crankshaft;

a gearbox output shaft;

a gearbox clutch controllably coupling and decoupling the crankshaft to the gearbox output shaft; and

a slipper clutch coupling the gearbox output shaft to a slipper clutch output shaft, wherein the slipper clutch is a separate structure from the gearbox clutch, and wherein the slipper clutch provides positive coupling of torque from the gearbox output shaft to the slipper clutch output shaft and at least some amount of slip in response to back-torque from the slipper clutch output shaft.

2. The engine of claim 1 wherein the slipper clutch comprises:

a gear engaged with the crankshaft;

a sprag coupling the gear to the slipper clutch shaft and providing engagement of the gear to the slipper clutch shaft substantially in only a spragged direction of rotation of the gear;

a clutch basket;

a stack of drive plates and friction plates disposed within the clutch basket;

a spring; and

a tensioner which adjustably applies tension from the spring against the stack to determine an amount of back-torque which is transferred from the gear through the slipper clutch to crankshaft in a freewheeling direction of rotation of the sprag.

3. The engine of claim 2 wherein the slipper clutch further comprises:

a dynamic adjuster for changing the tension which the tensioner applies.

4. The engine of claim 1 wherein the gearbox clutch provides some amount of slipper function.

5. The engine of claim 1 wherein the engine is an internal combustion engine.

6. The engine of claim 1 further comprising a motorcycle powered by the engine.

7. The engine of claim 1 wherein the engine is an electric motor.

8. A motor vehicle comprising:

a chassis;

an internal combustion engine coupled to the chassis, the engine including a crankshaft and an output shaft;

a primary clutch coupled to the crankshaft and to the output shaft to controllably couple and decouple torque from the crankshaft through to the output shaft;

a driven wheel rotatably coupled to the chassis and coupled to the output shaft;

a slipper clutch, separate from the primary clutch, and coupled to the crankshaft and to the output shaft to provide (i) a positive sprag engagement of torque from the crankshaft to the output shaft, and (ii) a slipper engagement limited amount of back-torque from the output shaft to the crankshaft.

9. The motor vehicle of claim 8 wherein the slipper clutch comprises:

a clutch shaft;

a gear engaged with the crankshaft;

a sprag coupling the gear to the clutch shaft and providing engagement of the gear to the clutch shaft substantially in only a spragged direction of rotation of the gear;

a clutch basket;

a stack of drive plates and friction plates disposed within the clutch basket;

a spring; and

a tensioner which adjustably applies tension from the spring against the stack to determine an amount of back-torque which is transferred from the gear through the slipper clutch to crankshaft in a freewheeling direction of rotation of the sprag.

10. The motor vehicle of claim 9 wherein the slipper clutch further comprises:

a dynamic adjuster for changing the tension which the tensioner applies.

11. The motor vehicle of claim 9 wherein:
the primary clutch is coupled at a first end of the crankshaft; and
the slipper clutch is coupled at a second end of the crankshaft.

12. The motor vehicle of claim 11 wherein:
the first end of the crankshaft is toward a front of the motor vehicle; and
the second end of the crankshaft is toward a back of the motor vehicle.

13. The motor vehicle of claim 11 wherein:
the output shaft is substantially perpendicular to the crankshaft; and
the slipper clutch includes a bevel gear coupled to a pinion gear on the output shaft.

14. The motor vehicle of claim 8 wherein the motor vehicle is a motorcycle.

15. The motor vehicle of claim 14 wherein:
the crankshaft is oriented parallel with a longitudinal axis of the motorcycle.

16. A motorcycle comprising:
a frame;
an engine coupled to the frame and including a crankshaft and a primary drive output;
a primary clutch coupling the crankshaft to the primary drive output;
a final output shaft;
a rear wheel coupled to the frame and to the final output shaft;
a slipper clutch coupling the primary drive output to the final output shaft to control back-torque transfer from the rear wheel to the primary drive output.

17. The motorcycle of claim 16 wherein:
the slipper clutch includes a dynamic adjuster for altering the back-torque transfer.

18. The motorcycle of claim 17 further comprising:
a controller coupled to the dynamic adjuster, whereby a rider of the motorcycle may control the back-torque transfer while riding the motorcycle.

19. The motorcycle of claim 16 wherein:

the slipper clutch is coupled to a swingarm of the frame.

20. The motorcycle of claim 19 wherein:

a final output shaft of the slipper clutch is coaxial with a swingarm pivot at which the swingarm is coupled to the frame.

21. The motorcycle of claim 20 wherein:

the final output shaft of the slipper clutch comprises a secondary output shaft; and

the slipper clutch includes a slipper clutch shaft which is coupled to and not coaxial with the secondary output shaft.

22. The motorcycle of claim 21 wherein:

the secondary output shaft rides is coupled to the swingarm by bearings which are coaxial with the swingarm pivot.